Incidence of Arrhythmias in Myocardial Infarction

Dr Basavaraj M Patil
Associate Professor, Department of General Medicine
Raichur Institute of Medical Sciences, Raichur.

Abstracts: Background: Acute myocardial infarction remains a major health problem. The deaths with acute myocardial infarction are believed to occur within first 24 hours after myocardial infarction and are attributed to arrhythmias. The objective of this study is to assess incidence of arrhythmias in myocardial infarction and to time of their onset in patients presenting with myocardial infarction. **Methods:** 100 patients with acute myocardial infarction admitted to the ICC unit of Govt. General Hospital, Gulburga & Basaveshwar Teaching & General Hospital Gulburga from one year data were taken for present study. A detailed case history was taken and a meticulous physical examination was done for each patients. This was recorded in a proforma at the time of admission, detailed history, physical examination, ECG changes, echocardiography and serum enzyme levels. Time of onset and type of arrhythmias was also noted. **Results:** Male to female ratio with 4:1, mortality was more in the group with risk factors of smoking, Hypercholesterolemia, hypertension and diabetes. Commonest arrhythmias noticed in this study were ST-40%, VPBs 35%, AVB-22%, BBB -20%, SB-15%, and VT - 10%. Out of the 100 patients with myocardial infarction studied, 76 patients had arrhythmias. Majority of arrhythmias occurred during less than 12 hours and Sinus tachycardia was the commonest arrhythmia (40%). **Conclusion:** The commonest arrhythmias encountered were sinus tachycardia followed by ventricular premature beats, AV blocks, bundle branch block, sinus bradycardia and ventricular tachycardia. SB & Complete heart block were more common in IWMI whereas ST, VPC, and UB f were more common with AWMI. In addition to arrhythmias, Cardiogenic shock added to the mortality. 51% of patients developed arrhythmias in one or the other form within 24 hours of admission. [Patil B NJIRM 2014; 5(6):102-107]

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Author for correspondence: Dr Basavaraj M Patil Associate Professor, Department of General Medicine Raichur Institute of Medical Sciences, Raichur **Email:** r_ramesh_777@yahoo.com

Introduction: There has been a considerable decline in deaths from cardiovascular causes from the past 50 years, but cardiovascular disease leftovers the solitary most important cause of usual deaths in all developed countries of the world.

Deaths from arrhythmias in myocardial infarction have been one of the most common causes of unexpected cardiac death. In particular ventricular fibrillation, 60% of all deaths related with acute myocardial infarction occur within 1st hour and are attributable to ventricular arrhythmias[1]. The recent improvement in arrhythmia detection and treatment has had a key impact on the result of myocardial infarction.

There is strong connection between the site of infarct and type of arrhythmias. Sinus bradycardia, sinoatrial, escape rhythms, complete heart block and Wenchebach type are typically associated with inferior wall myocardial infarction. Atrial and ventricular premature beats are more frequently seen in anterior wall myocardial infarction.[2]

There is a observation that the cascade leading to sudden death from arrhythmias can be expected by certain connections among structural and functional abnormalities and search for new tools for prediction, the modification of the existing tools, and the commencement of well designed intervention trials are the steps that must be taken towards the more well-organized prevention of early deaths from arrhythmias.[3,4] Consequently the present study is undertaken to evaluate the commonest types of arrhythmias in myocardial infarction and relation of these arrhythmias with site of infarction. Study is also undertaken to assess the time of their onset in patients presenting with myocardial infarction.

Methods: 100 patients with acute myocardial infarction admitted to the ICC unit of Govt. General Hospital, Gulburga & Basaveshwar Teaching & General Hospital Gulburga from one year data were taken for present study. Each patient gave written, informed consent to participate in the study and the study protocol was approved by the institutional review board including ethical issues.

Inclusion and Exclusion Scriteria: Patients admitted to the ICCU with history of chest pain within 48 hours, electrocardiogram taken and those patients with acute changes of MI in ECG were included in the study. Those patients with angina pectoris and unstable angina (with atypical ECG changes) or chest pain due to any other cause excluded from the study. Subendocardial infarction is excluded from the study.

Criteria for Established Mi: The diagnosis of acute myocardial infarction was based on the following criteria:

- Typical chest pain lasting for more than 30 minutes
- ST segment elevation >= 1 mm in two or more of limb leads as measured 0.08 second after J point / serial ST segment and T wave changes and /or development of pathological Q-waves in the same leads.
- Increase in serum CPK-MB enzyme level more than normal.

Data was collected in a pre-tested proforma by full filling objectives of the study, detailed history, physical examination, thorough cardiovascular and other systemic examination and necessary investigations. A twelve lead conventional electrocardiogram was recorded at the earliest after admission to the unit and electrocardiogram was repeated on three consecutive days after admission. All the patients were monitored for 48-72 hours for arrhythmias, acute left ventricular failure, cardiogentic shock and were treated with appropriate measure. Their stay in the ICCU was prolonged, if any complication developed or demanded further close observations. Patients were followed up for about 12-weeks in the medical wards or special room and then discharged.

At the time of admission to the ICCU , blood samples were drawn for routine investigations like Hb%, TC, DC, ESR, blood sugar, serum creatinine lipid profile and serum CPK-MB and SGOT, chest x-ray and echocardiography was done subsequently.
All patients were evaluated for risk factors like diabetes mellitus, hypercholestrolemia, hypertension and smoking. Routine investigations were restricted to the patients who really needed them. Enzyme studies were done in most of the cases. Patients were kept in the ICCU for a period of five days and more in complicated cases.

RESULTS: A total of 100 patients with male and female ratio of 4:1, with MI were included in the study. The maximum number of patients were found in the age group of 51-60 years (36%), followed by 41-50 years (24%), 61-70 years (20%), 31-40 years (14%), < 30 years (4%), and 71-80 years (2%). Mean age of patients was 53.61 ± 12.43 years

In the present study, 70% of patients had smoking, 36% of patients had hypercholesterolemia, 36% of patients had hypertension, and 20% of patients had diabetes mellitus as a risk factor.

The commonest symptom presented by patients was chest pain 94%, followed by perspiration 82%, nausea/vomiting 50% of cases, breathlessness 18% of cases, 10% of cases syncope, 5% of cases pain abdomen and 2% of cases palpitation.

The majority of patients (76%) had ST segment elevation MI, of which 19.7% had extensive anterior wall MI, 11.8% had inferior wall MI, 31.57% had anteroseptal wall MI, 23.7% had inferior wall with RV extension, 3.9% had anterolateral wall MI, 5.26% had inferior lateral wall MI, and non-ST elevation MI patients were 24%.
The incidence of various types of arrhythmias in myocardial infarction in relation to site of infarction is shown in table 1. Maximum incidence of arrhythmias like sinus tachycardia, VPCs bundle block were recorded in anterior wall MI while maximum incidence of bradycardia and AV blocks were observed in inferior wall MI. In arrhythmias of which Sinus tachycardia and ventricular arrhythmias are more common, 40% of cases had Sinus tachycardia followed by 35% of cases had ventricular premature beats (VPBs), 22% of patients had AV blocks, 20% of cases had Bundle branch blocks (BBB), 15% of patients had Sinus bradycardia (SB), 4% of patients had Junctional rhythm, 3% had Junctional ectopics , 2% had atrial fibrillation (AF) and Atrial tachycardia (AT) each.

Table 1: Incidence of Various Types of Arrhythmias In Relation To Site of Infarction

Arrhythmia	Total	Anterior Wall MI	Inferior Wall MI	Combined MI
Sinus tachycardia	40	30	10	-
Sinus bradycardia	15	02	13	-
VPB	35	24	11	-
Ventricular tachycardia	10	8	2	-
First degree AV block	7	1	6	-
Second degree AV block	2	-	2	-
Complete heart block	15	1	12	2
Unifascicular block	18	13	4	1
Bifascicular block	2	2	-	-
Trifascicular block	-	-	-	-

Incidence of arrhythmias from day 1 to day 8 was studied. According to this most of the patients presented with symptoms after 1 day or 3 days. The presence of arrhythmia was taken as on day 1 or day 3, etc. According to the result, Sinus tachycardia, Sinus bradycardia, Ventricular tachycardia & VF, AV blocks, Bundle branch blocks occurred within 24 hours. VPBs occurred after 24 hours.

Table 2: Showing Time of Appearance of Arrhythmias

Arrhythmia	No. of cases								Total % of arrhythmia recorded
	1	2	3	4	5	6	7	8	
Sinus tachycardia	34	4	2	-	-	-	-	-	40%
Sinus bradycardia	13	2	-	-	-	-	-	-	15%
Ventricular premature beats	28	3	2	-	1	-	1	-	35%
Ventricular tachycardia & VF	7	3	-	-	-	-	-	-	10%
AV blocks	14	2	1	1	-	-	-	-	18%
Bundle branch blocks	17	2	1	-	-	-	-	-	20%

Sinus tachycardia and sinus bradycardia present on the first day at presentation of patient symptoms had reverted back to normal sinus rhythm. Bundle branch block occurred from day 1 to day 3 it was usually left bundle branch block (LBBB) or right bundle branch block (RBBB). Incidence of arrhythmias according to days is shown in table 2.

Table 3: Showing Incidence of Various AV Blocks

Type of AV blocks	No. of patients	Percentage
First degree AV block	05	05
Second degree AV block	02	02
Mobitz Type I	2	2
Mobitz Type II	-	-
Complete heart block	15	15

Table 3 shows incidence of various AV blocks. 15% of myocardial infarction patients had complete heart block, followed by 5% had first degree blocks and 2% had second degree blocks and mobitz type-I each.

Table 4: Showing the Incidence of Bundle Branch Block

Type of Bundle Branch Block	No. of patients	Percentage
Unifascicular	18	18
Right bundle branch block	07	07
Left bundle branch block	02	02
Left anterior hemi block	08	08
Left posterior hemi block	01	01
Bifascicular block		
Right bundle	02	02

branch block + Left anterior hemi block		
Right bundle branch block + left posterior hemi block	-	-
Trifascicular block	-	-

Table 4 shows incidence of various Bundle Branch blocks. 18% of myocardial infarction patients had Unifascicular, followed by 8% had Left anterior hemi block, 7% had Right bundle branch block, 2% had Left bundle branch block and Right bundle branch block + Left anterior hemi block each.

Table 5: Showing Incidence of Complication Other Than Arrhythmia

Complications	No. of patients	Per
Left ventricular failure	26	26
Cardiogenic shock	10	10
Cerebrovascular accident	02	02
Congestive cardiac failure	06	06
Pericarditis	02	02

Table 6: Showing Time Of Appearance Of Arrhythmia After Admission

Time of appearance (hours)	No. of patients	Percentage
< 12	30	30
12 – 24	21	21
24 – 48	15	15
48 – 72	10	10

Incidence of complication other than Arrhythmia was shown in Table 5. 26% of myocardial infarction patients had Left ventricular failure, followed by 10% had Cardiogenic shock, 6% had Congestive cardiac failure, 2% had Cerebrovascular accident and Pericarditis each.

30% patients had shown appearance of arrhythmia after admission in less than 12 hours followed by 21% patients had shown between 12 to 24 hrs, 15% had shown between 24-48 hrs and 10% had shown between 48-72 hrs presented in Table 6.

Discussion: The maximum incidence of acute myocardial infarction observed in the present study was in the age group of 31 – 70 years (94%), of this 36% patients belong to 51 – 60 years group. Only 4% of cases were below the age of 30 years. Age incidence in this study is almost similar to the studies done by Marthin TC et al.5 and Mohit Shah et al.6 where 85% patients were between 35 and 75 years old. Age incidence is most likely more common because of life style, economic status and multiple risk factors.

Incidence of myocardial infarction in present study was more in males (80%) as compared to females (20%). The present study findings are consisted with Banerjea J.C.7 and Kock HL et al.8 showed 72% male and 24% females. It is more common because of life style and more risk factors like Hypercholesterolemia, hypertension, smoking, and diabetes mellitus.

In the present study, incidence of smoking was 70%, incidence of Hypercholesterolemia was 36% and incidence of hypertension was 25%, 20% had diabetes mellitus and 18% family history of IHD, almost similar findings were observed in the study done by Sushma Pandey et.al.9 Mortality was more in the group with risk factors of hypertension, smoking and diabetes.

Sinus bradycardia was commonly associated with inferior wall myocardial infarction. In the present study, 15 patients had sinus bradycardia, out of which 13 were of inferior wall MI. Similar observations were made by Rotman M et al.10 (10 – 30%), Podri PJ11. Nair M et al.12 also reported a higher incidence of complete heart block in inferior wall MI compared to anterior wall MI (75% vs. 53%).

In the present study, sinus tachycardia was present in 40% patients and commonly associated with anterior wall MI (30% cases) compared to inferior wall MI (10% cases). It represents an appropriate physiological response to left ventricular failure, congestive heart failure (CHF) or stimulation and over activity of the sympathetic nervous system.

The findings are similar to the study done by Philip J Podrid.11

Atrial fibrillation (2% cases) and atrial tachycardia (2% cases) were seen in extensive anterior wall MI as most commonly in those who had significantly left ventricular failure and CHF, and had increased mortality not because of arrhythmia itself, but to factors associated with it, particularly LV failure and cardiogenic shock. Study done by Philip J Podrid 11, Galcera Thomas J et al13 and Pizzetti F14 et al explained the AF and tachycardia was related with increased mortality in patients with LV failure.

In the present study, 20% of patients had bundle branch block whereas, study done by Newby K et al.15 was 8 – 18% bundle branch block. In the present study, out of 20 cases, 18% cases seen were Unifascicular, 8% cases Left anterior hemi block.

Ventricular arrhythmias were seen in 45 cases of which VPBs in 35 cases, VT & VF in 10 cases. Study conducted by Villacastin J et.al 16 showed total incidence of VPB 12% and VT 18% and Berisso MZ et al17 showed 19.7% VPBs and VT 6.8%. In the present study, incidence of VPBs cases seen more as compared to Julain Villacastin 16 and Berisso MZ et al17.

In the present study, the patients presented with symptoms after 1 day or 3 days. The presence of arrhythmia was taken as on day 1 or day 3. According to the result, Sinus tachycardia, Sinus bradycardia, Ventricular tachycardia & VF, AV blocks, Bundle branch blocks occurred within 24 hours. In 2 patients, VPBs were recorded as late as 5th and 7th day.

In present study 26% patients developed left ventricular failure followed by cardiogenic shock (10%), Congestive cardiac failure (6%), Cerebrovascular accident and Pericarditis (2%) each. Similar findings are observed by Kundu S C et al18 and Subramanyam et al19.

In the present study 51% of patients developed arrhythmias in one or the other form within 24 hours of admission, while 25% developed arrhythmia after 24 hours of admission, whereas in the study by Murthy R.S.N et al20 reported an incidence of 72.5% of arrhythmia occurring within 72 hours of admission and Aufderheide TP 21, 90% of patients with acute myocardial infarction have some cardiac rhythm irregularity within 24 hours following infarct onset.

Conclusion: The commonest arrhythmias observed were sinus tachycardia followed by ventricular premature beats, AV blocks, bundle branch block, sinus bradycardia and ventricular tachycardia & VF. Most of the arrhythmias were seen in the first 48 hours. Mortality was more in the group with risk factors of smoking, Hypercholesterolemia, hypertension and diabetes. SB & BBB were most commonly seen in IWMI where as ST, VPBs, AF and flutter were commonly seen in AWMI. ST, AF, flutter, VT and BBB were more commonly associated with LV failure. 51% of patients developed arrhythmias in one or the other form within 24 hours of admission.

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